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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/826,489	04/16/2004	Allen L. D'Ambra	AMAT/8303/CMP/ECP/RKK	1356

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EXAMINER
WILKINS III, HARRY D

ART UNIT	PAPER NUMBER
1795	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/826,489	D'AMBRA ET AL.	
	Examiner	Art Unit	
	Harry D. Wilkins, III	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 May 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-18,20 and 21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *18,20 and 21* is/are allowed.

6)☒ Claim(s) *1,3-5 and 7-12* is/are rejected.

7)☒ Claim(s) *6 and 13-17* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 May 2008* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings were received on 12 May 2008. These drawings are approved.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 3, 4 and 8-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dordi et al (US 2001/0052465) in view of Mayer et al (US 6,527,920) and Johnson et al (US 2002/0179544).

Dordi et al teach (see abstract and figures) a multiple chemistry electrochemical plating platform including multiple electroplating stations associated with the platform. Dordi et al teach a solution processing system (220) associated with the platform.

Dordi et al do not teach (1) that the electrochemical plating stations included a need for both anolyte and catholyte and (2) a combination of a solution mixing system with a fluid distribution manifold and an actuated valve positioned adjacent each of an anolyte and catholyte tanks.

Mayer et al teach (see abstract and figures) that separating an electroplating cell into anode area and cathode area and using separate anolyte and catholyte in each provided the advantage of preventing damage to the substrate to be electroplated by preventing anode-mediated degredation (i.e.-sludge) from reaching the substrate.

Therefore, it would have been obvious to one of ordinary skill in the art to have modified the system of Dordi et al to utilize anolyte and catholyte as taught by Mayer et al for the purpose of preventing issues caused by anode sludge reaching the substrate to be electroplated. It should be noted that Mayer et al teach separate anolyte and catholyte reservoirs.

Of note is that the anolyte and catholyte of Mayer et al are substantially similar in chemical make-up, with the anolyte lacking the plating additives necessary in the catholyte. Since Dordi et al teach a fluid supply system including a supply of base liquid and various additives (606), one of ordinary skill in the art would have been motivated to continue to use the single source of chemicals to make both the anolyte and catholyte of Mayer et al.

However, the fluid supply system of Dordi et al was capable of feeding the base liquid and various additives to only a single electrolyte reservoir (602).

Johnson et al teach (see abstract, figures and paragraphs 15, 72 and 110-112) a fluid delivery system capable of mixing solutions from multiple sources (inherently requiring a fluid distribution manifold) and delivering the mixed solution to multiple destinations.

Therefore, it would have been obvious to one of ordinary skill in the art to have incorporated the multiple source-multiple destination aspect of the fluid delivery system of Johnson et al into the electrochemical plating platform of Dordi et al and Mayer et al because the fluid delivery system of Johnson et al was capable of automatically creating

multiple chemistries from multiple sources to be delivered to multiple destinations, a process that previously would have involved much labor on the part of an operator.

The fluid system of Johnson included a solution mixing system having a manifold to distribute the source liquids to the output. Additionally, Dordi et al teach use of valves (607) to control the flow of electrolyte to the cells. Therefore, it would have been obvious to one of ordinary skill in the art to have placed valves in the flow lines to each of the anolyte and catholyte tanks associated with the plating platform to permit the distribution of anolyte or catholyte to each without permitting an undesired fluid to flow into the tanks. The fluid delivery system of Johnson et al included a fluid metering pump and a controller. The system of Dordi et al included a base solution container (deionized water with copper sulfate) and a plurality of additive containers as claimed.

Regarding claim 3, the system would inherently include a pipe connecting the valve associated with each tank and the tank to permit fluid flow.

Regarding claim 4, since each plating cell could operate with its own composition of electrolyte, each plating cell would have had its own set of anolyte and catholyte tanks.

Regarding claim 8, Dordi et al teach (see figures 26A and 26B and related description) including degasser modules positioned in electrolyte feed lines to remove air dissolved in the electrolyte to prevent bubble formation.

Regarding claim 9, Dordi et al teach the base solution container and plurality of additive containers, Mayer et al teach the need for separate anolyte and catholyte conduits and tanks and the electroplating cell having separate anolyte and catholyte

compartments and Johnson et al teach adding a fluid metering pump, a controller configured to operate the pump to create a desired solution from the multiple sources of chemicals and a fluid dispensing manifold after the pump and designed to distribute the flow of liquid to the multiple destinations.

4. Claims 5, 7 and 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dordi et al (US 2001/0052465) in view of Mayer et al (US 6,527,920) and Johnson et al (US 2002/0179544) as applied to claims 1, 4 and 9 above, and further in view of Mayer et al (US 2002/0074238 with reference to application no. 09/872,340 incorporated by reference in its entirety into the Mayer et al '238 publication).

The teachings of Dordi et al, Mayer et al '920 and Johnson et al are described above.

Mayer et al '238 teach (see paragraph 99) that problems were known in the art of electrochemical processing of semiconductor wafers including bubble formation in the electrolyte and that various solutions were contemplated. Instead of reciting those solutions, Mayer et al '238 incorporated by reference in its entirety application no. 09/872,340. The disclosure of application 09/872,340 therefore is open to public inspection and is considered to form a part of the disclosure of Mayer et al '238.

The disclosure of 09/872,340 teaches several embodiments to prevent and remove bubbles from electrolyte in electroplating systems. Included are fluid baffles (see figure 3) in the interior of recirculation tanks and an angled "wall" (Archimedes screw 317) to prevent bubbles from being formed where liquid dropped from above

enters the surface of the liquid already in the tank. Additionally, the fluid feed (321) from the tank was positioned in a lower portion to prevent bubbles from being transferred through since the bubbles were buoyant and rose to the top of the liquid.

Therefore, it would have been obvious to have incorporated the bubble reducing and removing features of application 09/872,340 into the system of Dordi et al, Mayer et al '920 and Johnson et al for the purpose of preventing and removing bubbles from the electrolyte to prevent plating defects caused by bubbles on a substrate surface.

Although 09/872,340 teaches using an Archimedes screw, one of ordinary skill in the art would have been aware that any sloping surface would have had the same functional effect of preventing bubbles at the liquid interface. Therefore, it would have been obvious to one of ordinary skill in the art to have made one side of the tank to be sloping and to utilize that sloping surface to feed the electrolyte into the tank to prevent bubble formation.

Regarding claims 16 and 17, it would have been obvious to one of ordinary skill in the art to have added a purge valve in any conduit to permit that conduit to be drained if neither the source nor the destination were suitable for draining, and to have controlled that purge valve using an already existing controller within the system.

5. Claims 18, 20 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dordi et al (US 2001/0052465) in view of Mayer et al (US 6,527,920), Johnson et al (US 2002/0179544) and Mayer et al (US 2002/0074238 with reference to application no. 09/872,340 incorporated by reference in its entirety into the Mayer et al ‘238 publication).

Dordi et al and Johnson et al teach a plating solution mixing and delivery system including a plating solution mixing assembly, Mayer et al '920 teach utilizing separate anolyte and catholyte tanks and 09/872,340 suggests a fluid bubble baffle system in the tanks to prevent and remove bubbles in the electrolyte.

Further, it would have been obvious to one of ordinary skill in the art to have included a valve for purging a line for draining any conduit leading to the tank to permit that conduit to be drained if neither the source nor the destination were suitable for draining.

Regarding claim 19 and 20, see above discussions regarding claims 5-7 and 10-17.

Regarding claim 21, Dordi et al and Johnson et al, as above, suggest the combination of a fluid metering pump, a base solution source, a plurality of additive sources and a controller for controlling the mixing of the sources to create different plating chemistries.

Response to Arguments

6. Applicant's arguments filed 12 May 2008 have been fully considered but they are not persuasive. Applicant has argued that Johnson et al do not teach a fluid metering pump with a plurality of inputs and at least one output as claimed, nor a controller for controlling the pumping action as claimed.

In response, Applicant has mischaracterized the teachings of Johnson et al. Johnson et al clearly show one of ordinary skill in the art a device with multiple inputs for mixing multiple source fluids and at least one output, connected through a peristaltic

pump (i.e.-a metering pump). Further, Johnson et al teach a device which can control (i.e.-a controller) the rate of pumping of each of the multiple source fluids (see paragraph [0045]). Thus, it is deemed that the combination of Dordi et al, Mayer et al and Johnson et al teach all of the structural elements as claimed.

7. Applicant's arguments, see page 21, first full paragraph, filed 12 May 2008, with respect to the features of claim 6, specifically the fact that the prior art does not show a fluid pass through at the lower portion of the wall, have been fully considered and are persuasive. The rejection of claims 6, 13-18, 20 and 21 has been withdrawn.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harry D. Wilkins, III whose telephone number is 571-272-1251. The examiner can normally be reached on M-F 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Susy Tsang-Foster can be reached on 571-272-1293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Harry D Wilkins, III/
Primary Examiner, Art Unit 1795

hdw